The persistence of compulsive checking: The role of distrust in attention and perception

by

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I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

A growing literature suggests that individuals repeatedly check in part because they lack confidence in their memories for previously-completed actions. It has also been hypothesized that the cognitive distrust demonstrated by individuals with OCD extends beyond memory to related factors such as attention and perception; however, the relation between distrust in attention, perception and memory has yet to be examined. The present study examined the extent to which distrust in attention and perception relate to memory distrust and compulsive checking in participants ranging in OCD symptom severity. A measure of distrust in attention and perception was developed for this purpose. Initial psychometric results indicated that distrust in attention and perception can be measured reliably and that it is related to previously-established metacognitive factors (e.g., distrust in memory) and OCD-relevant beliefs (e.g., inflated sense of responsibility). Importantly, the present results also indicated that distrust in attention and perception contributed to checking symptoms beyond memory distrust, baseline negative mood and neuroticism, and previously-established OCD beliefs (i.e., inflated sense of responsibility). Taken together, these findings suggest that distrust in attention and perception may be an important mechanism in the persistence of compulsive checking.

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Dedication

This Master's Thesis is dedicated to my loved ones who have provided years of support and encouragement. To my inspirational mother and sister and to my loving brother and father—thank you. And to Jake, whose support and commitment I feel every day.

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Introduction

Obsessive Compulsive Disorder (OCD) is a disorder characterized by the occurrence of unwanted, intrusive thoughts (obsessions) and the performance of repetitive, stereotyped rituals (compulsions). OCD is experienced by 1-2.5% of the population (APA, 2000) and is associated with considerable functional impairment and a diminished quality of life (Huppert, Simpson, Nissenson, Liebowitz, & Foa, 2009). The impact of OCD on functioning at work, home, school, and in social relationships is greater than that associated with some major physical diseases, such as diabetes (Koran, Thienemann, & Davenport, 1996). The condition is chronic and rarely remits without treatment (APA, 2000).

The behavioural model of OCD provided an early understanding of the disorder and served as a precursor to current cognitive-behavioural approaches. This model of OCD implicates Mowrer's (1960) two-factor theory of fear in the development and persistence of the disorder. According to this theory, obsessions give rise to an aversive affective response and compulsions are enacted to reduce that distress. The reduction in distress provides negative reinforcement of the compulsion. This is the theoretical premise on which treatment in the form of cognitive behavioural therapy with exposure with response prevention (CBT with ERP) is predicated; the individual is exposed to the obsession while the compulsion is prohibited, thereby allowing the aversive response to extinguish on its own, thereby making the compulsion obsolete. CBT with ERP is the most effective treatment of OCD to date (see Rowa, Antony, & Swinson, 2007 for a review).

However, it has recently been acknowledged that the two-factor theory has some important limitations as applied to OCD. First, it does not account for phenomena specific to OCD. For example, compulsive urges to check tend to wane if there is another person present.

Furthermore, many individuals with OCD do not have a history of relevant conditioning. In most cases of OCD, the obsessional fear (e.g., of contamination) cannot be traced back to previous experiences (Shafran, 2005; Taylor, Abramowitz, & McKay, 2007). To address these limitations, research over the last two decades has begun to consider the role of cognitive components in the disorder, leading to the emergence of contemporary cognitive-behavioural models.

According to cognitive models of OCD, obsessional problems arise when otherwise normal intrusive cognitions are erroneously appraised as having important meaning, as threatening, or as unacceptable (Shafran, 2005). For example, when obsessions are appraised as indicative of "bad, mad, or dangerous" traits (Rachman, 1997, p. 794), or that the individual "may be, may have been, or may come to be" responsible for harm (Salkovskis, 1999, p. S31), they will give rise to negative mood and compulsive rituals. Other beliefs and appraisals have also been identified (e.g., inflated responsibility and threat estimation, perfectionism and intolerance for uncertainty, and beliefs regarding the importance and control of thoughts; Obsessive Compulsive Cognitions Working Group [OCCWG], 2005). Indeed, substantial effort has been directed toward detailing the appraisals and beliefs perspective of the disorder (see Shafran, 2005; Taylor et al., 2007 for a review) and our understanding of the obsessional component of the disorder has grown considerably with the last two decades of research being devoted to understanding the role of appraisals and beliefs as key cognitive processes in OCD.

In contrast, our understanding of compulsive rituals has remained largely informed by early behavioural-conditioning explanations (e.g., Mowrer, 1960) which have suggested that compulsions begin in response to obsessions and the anxiety to which they give rise, and are repeated because the reduction in anxiety experienced after their performance serves as a powerful form of negative reinforcement. This model has been broadly applied to all symptom

presentations (e.g., washing, checking, symmetry compulsions), despite recognition that OCD is a heterogeneous condition (McKay, Abramowitz, Calamari, Kyrios, Radomsky, & Sookman, et al., 2004) and inconsistent observations, such as that obsessions do not always cause anxiety and that compulsions do not always alleviate it (Rachman & Hodgson, 1980). Accordingly, newer conceptualizations of the psychological mechanisms involved in compulsive behaviours are needed. In this vein, some researchers have begun to focus on compulsive rituals and make specific reference to the cognitive factors and processes that serve to maintain them (e.g., Frost & Hartl, 1996; Rachman, 2002; Wahl, Salkovksis, Cotter, 2008).

Perhaps the most extensive example of such research is that concerning the role of memory in compulsive checking. One of the most common types of compulsive rituals, checking can take various forms, including checking for safety (e.g., checking to ensure the door is locked) and checking for correctness (e.g., of written work). Checking can be performed physically, mentally, or by proxy (e.g., when an individual with OCD seeks reassurance from a spouse that the door is locked) (Stein, Forde, Anderson, & Walker, 1997). Compulsive checking is carried out in what oftentimes amount to extensive, protracted rituals that are repeated over and over again. It is this perseverative quality of checking that makes it so distressing and causes significant interference with one's life (Rachman, 2002)[1].

An early hypothesis concerning the role of memory in OCD was that individuals with OCD have a general memory deficit. Based on the clinical observation that compulsive checkers frequently report being unsure of whether they checked the stove, door, appliances, etc., it was

[1] In addition, it is this perseverative quality that is thought in part to distinguish compulsive checking from the more benign checking that is carried out by most individuals. For example, in an investigation of normal versus abnormal compulsions, Muris, Merckelbach, and Clavan (1997) found that although there was little difference between the content of "normal" and "pathological," compulsions, they could be readily distinguished on the basis of how frequently they were performed.

suggested that compulsive checkers "may simply be poorer at memory for prior actions, necessitating repeated checks," (Sher, Frost, & Otto, 1983, p. 358). However, associated empirical support has been equivocal. Whereas a few studies have found support for memory impairments in individuals with OCD (e.g., Tuna, Tekcan, & Topçuoğlu, 2005) and in checkers more specifically (e.g., Sher, Mann, & Frost, 1984), others have not (e.g., Radomsky & Rachman, 1999; Tolin, Abramowitz, Brigidi, Nader, Gordon, & Foa, 2001). Reviews of the role of memory in OCD have reached similarly mixed conclusions (e.g., see Coles & Heimberg, 2002; Muller & Roberts, 2005; Olley, Malhi, & Sachdev, 2007). Results of a meta-analysis by Woods, Vevea, Chambless, and Bayen (2002) indicate that memory impairment on both visual and verbal tasks may be moderately related to checking, although a small number of studies limited their ability to rule out alternative explanations (e.g., the influence of research group on effect size) for the effects.

It has also been proposed that memory impairments in OCD may take the form of a specific impairment in *reality monitoring*—the ability to distinguish memories of a past act from memories of an imagined act (Johnson & Raye, 1981). However, investigations of reality monitoring ability in OCD have generally found no evidence of reality monitoring deficits (e.g., see Constans, Foa, Franklin, & Matthews, 1995; Sher et al., 1983, or see Muller & Roberts, 2005 for a review).

As an alternative to the memory deficit hypotheses, it has been suggested that compulsive checkers have diminished confidence in their memory abilities. As such, they do not suffer from objectively poorer memories, but merely perceive this to be the case. It is the inability to feel confident of one's memory for a previously-completed action that is said to compel the individual to repeatedly check, rather than the absence of such a memory. This possibility has

received more consistent empirical support than the notion that memory deficits per se are leading to checking behaviour. For example, several studies have demonstrated that individuals with OCD express less confidence in their memories than do those without. In a seminal investigation, McNally and Kohlbeck (1993) examined episodic memory for actions completed in lab (e.g., tracing a drawing or word) and found that participants with OCD reported having less confidence in subsequent memory of the actions than did non-anxious control participants.

In a study of reality monitoring abilities and memory confidence, Hermans, Martens, De Cort, Pieters, and Eelen (2003) found that despite comparable memory accuracy for their actions, participants with OCD were more likely to report less confidence in their memory than were non-anxious control participants. A number of additional studies have documented similar effects (e.g., Cougle, Salkovskis, & Wahl, 2007; MacDonald, Antony, MacLeod, & Richter, 1997; Tuna et al., 2005). Indeed, in their meta-analysis of checking and memory studies, Woods and colleagues (2002) concluded that the lack of confidence in memory seen in compulsive checkers represents a larger and more consistent effect than does any effect relating to objective memory impairment.

Memory distrust has also figured prominently in Rachman's (2002) recent cognitive model of compulsive checking where it has been implicated as part of a "self-perpetuating mechanism" that purportedly drives checking recurrence (p. 629). According to Rachman (2002), memory confidence is eroded by the act of repeated checking itself such that "the more checking you do, the less confidence you have in your memory of the checking," (p. 630). Indeed, through a series of recent studies, researchers have discovered a reciprocal relationship between repeated checking and metamemory, such that the act of repeated checking, in itself, contributes to a loss of confidence in memory for the action. For example, Tolin and colleagues

(2001) examined memory accuracy and confidence for ideographically-selected "safe" (e.g., unlit candle), "unsafe" (e.g., lit candle), and "neutral" objects (e.g., baseball) among individuals with OCD, anxious control participants, and non-clinical control participants. Results indicated that despite no group differences in memory accuracy for the items, individuals with OCD experienced a progressive decline in memory confidence over repeated exposures to the unsafe item; a pattern that was not found in anxious and non-anxious control participants. Similarly, Boschen & Vuksanovic (2007) examined memory confidence after participants had been asked to repeatedly check a virtual stovetop and found that, despite no differences in objective memory performance, individuals with OCD showed poorer memory confidence than did control participants. Repeated checking of a real stovetop and other ideographically selected behaviours has produced similar effects (e.g., Ashbaugh & Radomsky, 2007; Coles, Radomsky, & Horng, 2006; Hermans, Engelen, Grouwels, Joos, Lemmens, & Guido, 2008; Moritz, Wahl, Zurowsk, Jelinek, Hand, & Fricke, 2007). Taken together, these studies provide further evidence that the lack of memory confidence seen in individuals with OCD is not based on objective memory problems, but results from the act of checking itself[2].

Recently, some researchers have suggested that OCD may be characterized by reduced confidence in attention and perception, in addition to reduced confidence in memory (Hermans et al., 2008). As such, research on metacognitive confidence in OCD has begun to extend beyond metamemory to consider confidence in additional metacognitive beliefs, such as confidence in attention and perception. Multicomponent views of attention have identified a number of elements that comprise this broad concept. For example, Mirsky, Anthony, Duncan, and Ahearn

[2] Note that a number of investigations have been directed toward elucidating the mechanism underlying this effect; although it is not the purpose of the present paper to detail proposed mechanisms, the interested reader is directed to Harkin & Kessler, 2009; Rachman, 2002; and van den Hout & Kindt, 2003.

(1991) have proposed a model with three significant elements of attention—focus, sustain, and shift. Within the context of checking, *focus* may be assessed as one's perceived ability to attend to important detail of the check, *sustain* may be assessed as one's perceived ability to concentrate on important aspects of the check, and *shift* may be represented as one's perceived ability to direct (and re-direct) attentional focus to relevant aspects of the check. Perception refers to the conscious experience of gathering information through the senses (i.e., through sight, sound, touch, and smell). Attention and sensory perception are important for later memory; if elements of a situation are not seen, heard, or otherwise sensed, they are unlikely to become encoded in memory. Similarly, the number and type of stimuli attended to in a given situation influence what becomes encoded in memory. Within the context of OCD and checking rituals: if an individual feels she has been unable to sufficiently attend to information during the checking ritual ("What if I became distracted and didn't notice the burner light?"), she will likely to feel less confident in her memory for that ritual ("Maybe the burner was still on!"). Similarly, if she feels that she has been unable to sufficiently see, hear, or feel information during the checking ritual ("What if I didn't see the spark?"), she is likely to feel less confident in her memory for that ritual.

Janet (1903) provided an early reference to the phenomenon of perceptual distrust in OCD when he suggested that "patients may report the subjective feeling of being blind or deaf without any objective evidence," (as cited in Pitman, 1984, p. 229). More recently, the Inference Based Model of OCD (O'Connor, & Robillard, 1995; O'Connor, Aardema, & Pélissier, 2005) has emphasized the role of perceptual distrust in a type of reasoning error that is characteristic of OCD. In one type of reasoning error—termed *inverse inference*-- the individual is said to infer a remote possibility without any indication of it being present, or even in contradiction to what is

seen or sensed (e.g., the individual thinks "A person has used this table, therefore it must be dirty," even though table looks clean). A central component of this idea is that the person degrades the role of the senses and objective reality in order to look for a "deeper reality" (e.g., "I see the table is clean, but my intelligence tells me it might not be clean,"). The tendency to engage in this type of reasoning may in part reflect distrust in one's perceptual abilities.

Emergent empirical evidence supports the notion that cognitive distrust demonstrated by individuals with OCD might extend beyond memory to related factors such as attention and perception (Hermans et al., 2003; Hermans et al., 2008; Nedeljkovic & Kyrios, 2007; van den Hout, Engelhard, de Boer, du Bois, and Dek, 2008). In a study designed to examine whether OCD is associated with confidence in attention and perception in addition to confidence in memory, Hermans and colleagues (2008) found that individuals with OCD reported less confidence in attention and perception than did psychiatric and non-clinical control participants; an effect that was particularly apparent for OCD- relevant actions. Interestingly, they also found that OCD individuals' reported levels of confidence in memory were not significantly different from their reported levels of confidence in attention and memory, suggesting that all three cognitive domains are distrusted equally.

It has also been hypothesized that reduced confidence in attention and perception may underlie the reduced confidence in memory seen in individuals with OCD (Hermans et al., 2008). For example, it has been suggested that individuals with OCD might believe that they experienced moments of lessened attention while checking and subsequently mistrust their memory for the check as a result. Although some have found that confidence in attention is a more statistically pronounced effect than confidence in memory (Hermans et al., 2003), and others that individuals with OCD report difficulties with concentration in addition to difficulties

with memory (Nedeljkovic, Moulding, Kyrios, & Doron 2009), research has yet to examine whether confidence in attention and/or perception do in fact predict confidence in memory.

It has been argued that research on metacognition in OCD should move beyond the study of memory. However, research to date has examined confidence in attention and perception and their relation to memory confidence in a cursory way. Studies have assessed constructs such as confidence in attention and perception with very brief measures and have yet to consider the relationship between constructs. For example, Hermans and colleagues (2008) assessed the constructs of confidence in memory, attention, and perception with three-item measures and failed to consider whether confidence in attention and perception were predictive of confidence in memory. As a result, our understanding of how confidence in attention, perception and memory relate to one another and ultimately to the maintenance of compulsive checking is far from complete.

Present Investigation

The primary purpose of the present study was to examine the extent to which distrust in attention and perception relates to confidence in memory and compulsive checking. In this regard, the present study had two main objectives. First, the study considered the relation of distrust in attention and perception to memory distrust. More specifically, following from previous literature which suggests that confidence in attention and perception may underlie memory distrust, the present study examined whether distrust in attention and perception predict distrust in memory.

Second, the present study examined the extent to which cognitive distrust (i.e., distrust in memory, attention, and perception) relate to OCD symptoms, particularly checking compulsions. Given previous research suggesting that confidence in attention and perception may occur at a

more fundamental level than confidence in memory, the current study considered whether distrust in attention and perception contribute to compulsive checking over and above the contribution of distrust in memory. Previous literature has also suggested that metacognitive confidence might be considered part of a larger set of established beliefs that are characteristic of OCD (e.g., beliefs related to responsibility, control and importance of thoughts, and threat estimation). As such, the unique contribution of confidence in memory, attention, and perception over and above previously established beliefs (responsibility, importance/control of thoughts, perfectionism/certainty) was considered with respect to compulsive checking.

Each of the objectives above was examined using a more comprehensive measure of confidence in attention and perception. In previous literature, these constructs have been measured using very brief (e.g., three-item) measures that have been administered repeatedly as part of an experimental task. There has yet to be a measure of general confidence in attention and perception as it relates to checking behaviour in general (rather than specifically in relation to a just-completed laboratory task). The Memory and Checking Influences Questionnaire was constructed by the study author for this purpose. The scale consists of twelve items assessing the extent to which individuals are distrustful of their attentional and perceptual capacities while checking an important item or situation. Previous research suggests that "normal" and "abnormal" compulsions (e.g., checking) exist along a continuum such that they differ not in content, but in other respects such as frequency and intensity (Gibbs, 1996; Muris, Merckelbach, & Clavan, 1997). In the present study, participants were asked to base their MCIQ responses on the item or situation they check most frequently. Assessing responses based on the most frequently checked item will help to ensure that the sample in the present study represents a suitable analogue of clinically significant compulsive checking. The appropriateness of using

analogue samples in OCD research has been recognized elsewhere (e.g., Mataix-Cols, Vallejo, & Sànchez-Turet, 2000, Muris, et al., 1997).

Method

Participants

One hundred and sixty four participants (111 female) were recruited from a sample of undergraduate psychology students at the University of Waterloo. Participants ranged in age from 17 to 65 years old (M=21.0 years, SD= 5.59 years). The majority of participants identified as Caucasian (36.6%), with the remaining participants identifying as Chinese (28.7%), other Asian (8.5%), East Indian (6.7%), or of another ethnic background (15.8%). Six participants (3.6%) declined to identify their ethnicity. Participants were told that the study would take approximately 1 hour to complete and in exchange received additional course credit towards their psychology course. Participants were recruited for the study based on previously established responses on the Obsessive-Compulsive Inventory- short version (OCI-SV; Foa, Huppert, Leiberg, Kichic, Salkovskis, Hajcak, & Langner, 2002) checking subscale such that a range of compulsive checking scores were included in the sample. Participants completed the questionnaires anonymously through an online system at home or on a computer in the laboratory.

An independent samples t-test with pooled variance revealed a significant difference among the online versus in lab groups on the Vancouver Obsessional Compulsive Inventory (VOCI; Thordarson, Radomsky, Rachman, Shafran, Sawchuk, & Hakistan, 2004) checking subscale score $t(156)= 2.16$, $p<.05$ and the Obsessive Belief Questionnaire (OBQ-44; OCCWG, 2005) importance/control of thoughts subscale score $t(161)= 2.45$, $p<.05$, suggesting that individuals who completed the study in the lab reported greater checking severity and stronger beliefs about the importance of and need to control thoughts than did individuals who completed the study online. No other self-report measures yielded significant results.

Independent samples t-tests with pooled variance were also used to compare male and female participants on self-report measures. Results revealed that females reported greater anxiety symptoms (as assessed by the Beck Anxiety Inventory; BAI) than did males $t(156)= 2.3$, $p<.05$. No other measures yielded significant results.

Measures

Memory and Checking Influences Questionnaire (MCIQ). This measure was constructed by the study author for the purposes of the present study. The MCIQ is designed to assess one's confidence in his/her attention and perception while checking. Participants are asked to rate their agreement with each of twelve items using a five-point Likert type scale, ranging from 0 (never) to 4 (always) based on the item or situation checked most frequently. Sample items include "While I am checking, I feel as though my senses might be missing something," and "I have difficulty keeping my attention focused on what I am checking." Items are summed with higher scores representing greater distrust in attention and perception while checking. The psychometric properties of this measure will be evaluated as part of the present study.

Beck Anxiety Inventory (BAI). The BAI (Beck & Steer, 1993) is a measure of the severity of self-reported anxiety. Each of 21 descriptive statements of anxiety symptoms are rated on a four-point scale from 0 (not at all) to 3 (severely; I could barely stand it) based on the individual's experience over the past week. The BAI is widely used and has been shown to have good reliability and a wide range of studies attest to its validity (see Beck & Steer, 1993).

Beck Depression Inventory- Second Edition (BDI-II). The BDI-II (Beck, Steer, & Brown, 1996) is a frequently used measure of depressive symptom severity. This 21-item measure reflects the cognitive, behavioural, emotional, and somatic symptoms common to depression.

Participants are asked to use a scale of 0 to 3 to indicate the extent to which each symptom has been present over the past two weeks. The BDI-II has been found to have high internal consistency and good validity among college students and outpatients (Beck, Steer, & Brown, 1996). Scores from all the items are summed to create a total score ranging from 0 to 63, with higher scores indicating greater levels of depressive symptoms.

Inferential Confusion Questionnaire (ICQ). The ICQ (Aardema, O'Connor, Emmelkamp, Todorov, & Marchand, 2005) is a 15-item questionnaire measuring inferential confusion as indicated by inverse inference and a distrust of the senses (see O'Connor, Aardema, & Pelissier, 2005). Items are rated on a five-point scale from 1 (strongly disagree) to 5 (strongly agree). The ICQ has been shown to have good reliability and validity in non-clinical and clinical populations (e.g., OCD and delusional disorder; Aardema et al., 2005). Inferential confusion, as measured by the ICQ, has also been found to be related to treatment outcome and has shown discriminant validity with measures of general distress (Aardema, Emmelkamp, & O'Connor, 2005).

International Personality Item Pool-NEO (IPIP-NEO). The IPIP-NEO (Johnson, J.A; see Goldberg, 1999) is a 120-item measure of the Big Five facets of personality (openness to experience, conscientiousness, extraversion, agreeableness, neuroticism) that is available in the public domain (www.personal.psu.edu.j5j/IPIP/). Participants are asked to indicate how accurately each statement represents the way they usually are, using a five-point scale, ranging from 1 (very inaccurate) to 5 (very accurate). Scores for each of the Big Five personality dimensions are calculated by averaging the relevant responses with higher scores reflecting a greater frequency or intensity of the thoughts, feelings, and behaviours associated with a particular personality trait.

Mindful Attention Awareness Scale- Lapses Only (MAAS-LO). The MAAS-LO (Carriere, Cheyne, & Smilek, 2008) is a revised version of the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003). This 12-item scale is a measure of everyday lapses in attention. Participants are asked to use a six-point Likert scale, ranging from 1 (almost never) to 6 (almost always) to indicate how frequently they currently experience each of a number of everyday experiences. Sample items include "I do jobs or tasks automatically, without being aware of what I'm doing," and "It seems that I am 'running on automatic' without being aware of what I am doing." The MAAS-LO has demonstrated good psychometric properties in a student sample (Carriere et al., 2008).

Memory and Cognitive Confidence Scale (MACCS). The MACCS (Nedeljkovic & Kyrios, 2007) is designed to capture a range of general beliefs about memory and related processes, such as confidence in decision-making abilities, concentration, and attention. Participants are asked to provide responses based on a seven-point Likert type scale, ranging from 1 (strongly disagree) to 7 (agree very much). Sample items include "I experience many doubts after making a decision," and "My memory can mislead me at times." The MACCS has demonstrated good internal consistency and adequate validity in clinical and student samples (Nedeljkovic & Kyrios, 2007; Nedeljkovic et al., 2009).

Obsessive-Compulsive Inventory- short version (OCI-SV). The OCI-SV (Foa et al., 2002) is an 18-item self-report measure of obsessive-compulsive symptoms. It is based on the widely used 84-item OCI (Foa, Kozak, Salkovskis, Coles, & Amir, 1998).Participants are asked to rate the degree to which they are bothered or distressed by OCD symptoms in the past month on a five-point scale from 0 (*not at all*) to 4 (*extremely*). The OCI-SV factor structure is comprised of six factors, corresponding to (a) washing, (b) checking, (c) ordering, d) obsessing, (e) hoarding,

and (f) mental neutralizing. The OCI-SV has demonstrated acceptable reliability estimates, including good Cronbach's internal consistency coefficients for each of the six subscales and good validity estimates in both clinical and student samples (Hajcak, Huppert, Simons, & Foa, 2004). Convergent validity with other measures of obsessive-compulsive symptoms in a non-clinical student population has been found to be moderate to excellent and the OCI-SV has also demonstrated good divergent validity with pathological worry (Hajcak et al., 2004). In all, this evidence indicates that the OCI-SV is a short, psychometrically sound measure of obsessive-compulsive symptoms.

Obsessive Belief Questionnaire (OBQ-44). The OBQ-44 (OCCWG, 2005) is a 44 item self report scale that measures belief domains linked to OCD. Participants are asked to indicate how much each statement reflects the way they typically look at things, using a seven-point scale, from 1 (disagree very much) to 7(agree very much). Factor analysis has revealed a three-factor structure of this measure: (1) Responsibility/Overestimation of Threat, (2) Tolerance for Uncertainty/Perfectionism, and (3) Importance of Thoughts/Control of Thoughts. Each of the three factors has been found to have good internal consistency (e.g., Tolin, Worhunsky, & Maltby, 2006) and the overall scale has shown good criterion-related validity in non-clinical and clinical samples (OCCWG, 2005).

Vancouver Obsessional Compulsive Inventory (VOCI). The VOCI (Thordarson, et al., 2004) is a 55-item self-report measure is designed to provide an assessment of a range of obsessions, compulsions, avoidance behaviour, and personality characteristics in obsessive-compulsive disorder (OCD). The scale is comprised of six subscales, each measuring a different symptom type: contamination, checking, obsessions, hoarding, just right, and indecisiveness. Participants are asked to use a five-point Likert scale to indicate the extent to which each of the

55 statements is true of them. The VOCI has exhibited good internal consistency, adequate test-retest reliability, and acceptable convergent and divergent validity in clinical and student samples (see Thordarson et al., 2004).

Results

Factor Structure of New Measure

The factor structure of the new measure of confidence in attention and perception was examined. Exploratory analyses were conducted by entering all 12 items into a Principal Axis factor analysis with oblimin rotation. Three factors with eigenvalues greater than 1 emerged. Six items pertaining to distrust of perception loaded on the first factor (loadings ranged from .644 to .774). The second factor was comprised of the three reverse-coded items of the six items pertaining to distrust of attention (loadings ranged from .520 to .871). This factor shared weak correlations with factor 1 and factor 3 (r=.12 and r=. 04, respectively). The remaining three items distrust of attention (*not* reverse coded) loaded onto the third factor (loadings ranged from .549 to .674). This factor shared a correlation of .46 with the first factor. Table 1 shows the items and their respective factor loadings as indicated by the factor pattern matrix. However, examination of the eigenvalues revealed a large discrepancy between the first and subsequent factors from an eigenvalue of 4.36 for the first factor to 1.93 and 1.32 for the second and third factors, respectively. Examination of the scree plot of the eigenvalues also suggested a one factor solution (see Figure 1). Given the discrepancies between the first and subsequent eigenvalues and the results of the scree plot, a single factor solution involving all 12 items was examined using Principal Axis factor analysis with oblimin rotation. Interpretation of the factor structure matrix revealed that item loadings on this single factor ranged from .076 to .788, with the three reverse-coded items having loadings of .076, .127, and .159. As such, a single factor solution containing the three reverse-coded items was not viable. Next, a single factor solution was examined by entering the nine variables into Principal Axis factoring with oblimin rotation. Given their weak loadings in the foregoing single factor solution, the three reverse coded items were excluded from this analysis. Interpretation of the factor structure matrix revealed that item

loadings onto this single factor ranged from .356 to .799. Table 3 shows factor loadings for each of the nine items as indicated by the factor structure matrix. Cronbach's alpha revealed an acceptable level of internal consistency for this single scale (α= .86). Thus, a single subscale score containing six items pertaining to distrust of perception and three items pertaining to distrust of attention was computed and used for in all analyses. Conceptually, higher scores on this subscale indicate greater distrust in attention and perception.

Preliminary Analyses

Overall means and standard deviations for all variables assessed in the present study are presented in Table 4. Overall means and standard deviations for items comprising the distrust in attention and perception scale are presented in Table 5. Pearson correlations were used to examine the relationship between confidence in attention and perception and measures related to mood, personality, obsessive-compulsive symptoms, and attention. Zero-order correlations for all of the measures of interest in the current study are presented in Table 6.

The nine-item measure of confidence in attention and perception shared positive relationships with measures of obsessive-compulsive symptoms. Pearson correlations indicated that distrust in attention and perception was positively correlated with obsessive-compulsive beliefs domains, including responsibility/threat (OBQ-44: RT; r=. 40, p<.01), perfectionism/certainty (OBQ-44:PC; r=. 19, p<.05), beliefs about the importance of thoughts and the need to control thoughts (OBQ-44:ICT; r=. 37, p<.01) and obsessive-compulsive symptoms (VOCI; r=. 51, p<.01), including checking (VOCI checking subscale; r=. 45, p<.01). These relationships remained significant after controlling for the influence of mood (depression, anxiety) and neuroticism (see Table 7). One exception was the relationship between confidence

in attention and perception and the belief domain of perfectionism/need for certainty, which did not remain significant after controlling for mood. Taken together, these results suggest that individuals who experience a greater degree of obsessional beliefs and related symptoms also experience greater distrust in their attention and perception.

Pearson correlations were then calculated to examine the relation of distrust in attention and perception to measures that are conceptually related. Results indicated that distrust in attention and perception was positively related to greater levels of self-reported lapses in attention (MAAS-LO; r=. 39, p<.01), greater distrust in memory (MACCS general memory subscale; r=. 36, p<.01), and a greater degree of inferential confusion-- a reasoning error based on distrust of the senses (r=. 39, p<.01). These relationships remained significant after controlling for the effect of mood (BAI, BDI-II) and personality-related variables (neuroticism) (see Table 7). Thus, individuals who reported greater distrust in attention and perception also reported greater instances of everyday lapses in attention and inferential confusion—reasoning process hypothesized to involve distrust of the senses.

Finally, Pearson correlations were calculated to examine the relationship of distrust in attention and perception to mood and personality-related variables. Distrust in attention and perception was significantly related to measures of mood, including depression (BDI-II; r=. 36, p<.01) and anxiety (BAI; r=. 37, p<.01). Thus, individuals who reported psychological greater levels of depression and anxiety also reported greater distrust in attention and perception. Similarly, individuals who reported a higher degree of the personality trait neuroticism also reported greater distrust in attention and perception (r=. 30, p<.01).

Main Analyses

Hierarchical multiple regression with negative mood and neuroticism entered on the first step and distrust in attention and perception entered on the second step was used to examine whether distrust in attention and perception predicted distrust in memory. Results indicated that distrust in attention and perception had a unique effect on memory distrust [$F_{change}(4,141)= 10.96$, $\beta=.25$, $p<.001$], explaining an additional 5 percent of the variance in confidence in memory over and above the effect of negative mood and neuroticism (Table 8).

Given previous research suggesting that confidence in attention and perception may occur at a more fundamental level than confidence in memory, the current study used hierarchical multiple regression to examine whether attention and perception contribute to compulsive checking over and above the contribution of distrust in memory. Memory distrust, negative mood, and neuroticism were entered on the first step along with study location (the latter was entered in these analyses to serve as a control factor as a previous t-test revealed significant difference in checking symptoms between online and in lab participants). Distrust in attention and perception were entered on the second step of the regression. Results revealed that the addition of distrust in attention and perception made a significant improvement in the model [$F_{change}(6,137)= 15.68$, $\beta=.32$, $p<.001$], contributing an additional 8 percent of the variance in checking symptoms (Table 9).

Finally, hierarchical multiple regression was used to examine the unique contribution of distrust in attention and perception to checking symptoms over and above previously established OCD beliefs. Analyses with OBQ subscales (responsibility/overestimation of threat; tolerance for uncertainty/perfectionism, and importance of thoughts/control of thoughts) entered on the

first step and distrust in attention and perception entered on the second step found that distrust in attention and perception contributed an additional 6 percent of the variance in checking beyond that contributed by these previously established OCD belief domains [$F_{change}(4,148)= 13.63$, $\beta=.276$, $p<.001$] (See Table 10).

Taken together, the data suggests that distrust in attention and perception may contribute to one's lack of confidence in memory. Further results suggest that it may be important to examine distrust in attention and perception in addition to a lack of confidence in memory when evaluating contributing factors to compulsive checking.

Discussion

The present study examined the extent to which distrust in attention and perception relate to distrust in memory and compulsive checking. A new measure was constructed for this purpose. Initial psychometric results indicated that distrust in attention and perception can be measured reliably and that it is related to previously-established metacognitive factors (e.g., distrust in memory) and OCD-relevant beliefs (e.g., inflated sense of responsibility). That is, individuals who reported greater distrust in attention and perception also reported greater levels of memory distrust and OCD symptoms-- both cognitive (i.e., beliefs) and behavioural (e.g., checking). These relations were not entirely due to the shared effects of baseline negative mood or neuroticism. Moreover, the present results indicated that distrust in attention and perception predicted distrust in memory over-and-above negative mood and neuroticism. As such, the results of the present study support previous assertions that distrust in attention and perception contribute to--and may even underlie-- self-reported memory distrust (e.g., Hermans et al., 2003; Hermans, et al., 2008; Nedeljkovic & Kyrios, 2007; van den Hout, et al., 2008). More importantly, the present results also indicated that distrust in attention and perception contribute to checking symptoms over and above other metacognitive factors (i.e., memory distrust), negative mood and neuroticism, and previously-established OCD beliefs (i.e., inflated sense of responsibility). Taken together, these findings suggested that distrust in attention and perception are relevant to other metacognitive factors and ultimately to OCD symptoms.

Results of the present study are consistent with Rachman's (2002) cognitive model of compulsive checking which implicates metacognitive factors in addition to previously-established OCD beliefs in the recurrence of compulsive checking. In the present study, distrust in attention and perception predicted greater self-reported checking symptoms over and above

other OCD relevant cognitions such as increased responsibility. Moreover, the results of the present study represent an extension of literature supporting an association between metacognitive factors and checking compulsions as they suggest that checking symptoms are not only associated with greater levels of distrust in memory, but also distrust in attention and perception. As such, the results of the present study suggest that future consideration of metacognitive confidence in OCD should extend beyond metamemory to consider additional cognitive domains.

A strength of the present study is that it used a more comprehensive measure of distrust in attention and perception that was completed in a manner that is more ecologically valid. In past, examinations of the relation between distrust in attention, perception and memory have used brief (e.g., 3-item) measures of cognitive confidence administered repeatedly as part of an experimental checking task. However, clinical experience suggests that individuals with OCD check a wide variety of items and situations. Thus, it is important to investigate these relationships within the context of ideographic checking behaviour as opposed to a subset of checking trials that can be created in the laboratory. In the present study, participants were asked to respond to scale items based on the object they check most frequently. As such, the results provide a more ecologically valid reflection of the relation of distrust in attention and perception to checking behaviour.

An important theoretical consideration related to the present study concerns the question: Why is there an association between decreased cognitive confidence and compulsive checking? One possibility that has been proposed is that the act of repeated checking *itself* has an ironic effect on confidence. Indeed, this has become one of the main postulates of Rachman's (2002) theory of cognitive checking and, as previously noted, has been demonstrated in a variety of

research studies (e.g., Boschen & Vuksanovic, 2007; Coles et al., 2008; Hermans et al., 2008). Alternatively, it has been suggested that uncertainty may be a general characteristic of individuals with OCD, especially checkers (Dar, Rish, Hermesh, Taub, & Fux, 2000; Dar, 2004). As such, the lack of confidence in compulsive checkers may not be unique to memory judgments (or, by extension, to judgements of attention and perception). It is possible that in the present study, the association between greater checking symptoms and greater distrust in attention and perception may be a reflection of a more general and pervasive uncertainty. The present study did not address this issue directly as it focused on confidence in knowledge about one's prior actions and did not assess confidence in more general types of knowledge. However, it remains an important consideration for future research.

The study was conducted using a sample of undergraduate students who reported a range of obsessive-compulsive symptom severity. Previous research suggests that OCD symptoms likely exist along a continuum (Gibbs, 1996) and that analogue samples are appropriate to use in OCD research (Mataix-Cols et al., 2000, Muris, et al., 1997). However, it remains possible that a different pattern of results would emerge with a sample of individuals who engage in more pronounced compulsive checking (i.e., a clinical sample). In addition, epidemiological studies have suggested that OCD is commonly comorbid with other disorders, including other anxiety disorders, mood disorders, eating disorders and some personality disorders (APA, 2000). While the present study controlled for the effect of depressive symptoms and symptoms of anxiety, it did not gather information about psychiatric history. Taken together, it is important that the results of the present study be replicated in a clinical sample that is representative of the population of individuals with OCD in order to further understand the role of metacognitive confidence in OCD. In addition, the cross-sectional, uni-method approach of the present study

limits the generalizability of the results. It will be important for future research to replicate the current pattern of results using methods other than self-report (e.g., behavioural indices). This research is currently underway by the author of the present study.

This study served as an extension of emergent research on metacognitive confidence in OCD. Taken together, this body of research suggests that distrust in memory, attention, and perception may contribute to the recurrence of compulsive checking. Knowledge of the role of cognitive distrust in the persistence of compulsive checking may help provide a more complete account of the maintenance factors involved in OCD. As such, research concerning the role of cognitive confidence in OCD has a number of clinical implications.

Cognitive behavioural therapy (CBT) is considered the gold standard treatment for anxiety disorders, including OCD (Hofman & Smits, 2008). An integral component of CBT for OCD is psychoeducation in which information about the nature of OCD and its treatment is provided to the individual. This includes information on the role of dysfunctional beliefs (e.g., inflated sense of responsibility, beliefs about the importance of and the need to control thoughts, and beliefs related to perfectionism/ intolerance for uncertainty) in the maintenance of OCD. Interventions designed to challenge these beliefs (e.g., cognitive restructuring, behavioural experiments) are also an integral part of CBT for OCD (Taylor, Thordarson, & Söchting, 2002).

The observation that individuals with OCD report decreased cognitive confidence in the absence of objective impairment has led some to suggest that metacognitive confidence (or lack thereof) may be conceptualized as a faulty belief that is characteristic of OCD and that interventions designed to target metacognitive confidence might result in clinically-significant benefits (Nedeljkovic et al., 2009). At present, studies examining the effect of repeated checking on memory suggest that interventions designed to demonstrate the effect of repeated checking on

metacognitive confidence might help at the very least to demystify the often unsettling loss of confidence in memory experienced by compulsive checkers. This information can prove powerful for an individual who fears that in a few years his/her memory will deteriorate to the point of becoming incapacitated (Rachman, 2002). However, further research is needed before metacognitive confidence is incorporated into current CBT treatment protocols. This research should focus on examining whether metacognitive distrust should be considered a belief domain in OCD. In addition, future research is needed to establish the prevalence of cognitive distrust in cases of OCD with primary compulsions other than checking. Recent evidence suggests that individuals with primary washing/cleaning compulsions favour subjective information (i.e., a feeling of knowing) over objective, perceptual information (e.g., seeing dirt or feeling stickiness on one's hands) in deciding when it is safe to terminate a compulsive wash (Wahl, Salkovskis, & Cotter, 2008). This is early evidence to suggest that distrust in the senses (i.e., perception) may also operate in cases of compulsive washing/cleaning. However, far more research is needed to establish the generality of cognitive distrust in OCD before it is incorporated into treatment interventions (Hermans et al., 2008).

In sum, the present study revealed that metacognitive distrust associated with compulsive checking extends to the domains of attention and perception. Furthermore, the present study indicated that distrust in these domains may in fact contribute to the memory distrust that has been noted in past research on metacognitive confidence. More importantly, the present results suggest that distrust in attention and perception may contribute to compulsive checking symptoms. Initial psychometric properties of the measure developed for the present study indicate that it is a reliable and valid measure of these constructs. As such, it may prove useful in future research that examines the role of metacognition in OCD. Ultimately, the results of the

present study contribute to a growing literature that implicates metacognitive factors as clinically relevant to obsessive-compulsive disorder.

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Table1

Exploratory factor analysis: factor pattern matrix showing three factor solution

Item	Loadings		
	Factor 1	Factor 2	Factor 3
Perception			
7. While I am checking, I don't feel I can completely trust what I am feeling with my hands.	**.728**	.059	-.176
15. While I am checking, I wonder if I am having trouble seeing and hearing.	**.644**	-.057	.100
19. While I am checking, I don't feel I can completely trust what I am seeing.	**.774**	.068	-.012
21. While I am checking, I don't feel I can completely trust what I am hearing.	**.757**	-.030	.087
23. While I am checking, I feel as though my senses might be missing something.	**.748**	-.016	.048
28. What I am seeing and hearing while I am checking is misleading.	**.675**	-.089	.215
Attention			
17. While I am checking, I am able to pay attention to the most important details. (R)	-.021	**.639**	.118
22. While I am checking, I am able to shift my attention to the most important details. (R)	.044	**.871**	-.079
25. If I make mistakes while checking, I am confident I will notice them. (R)	-.010	**.520**	-.009
26. I have difficulty keeping my attention focused on what I am checking.	.163	.179	**.674**
20. While I am checking, I sometimes do it automatically and forget to pay attention to the details.	.023	-.134	**.549**
16. I can be easily distracted while I am checking.	-.005	.090	**.595**

Table 2

Exploratory factor analysis: factor structure matrix showing single factor solution with reverse-coded items excluded (α=.86)

Item	Loadings
21. While I am checking, I don't feel I can completely trust what I am hearing.	.799
28. What I am seeing and hearing while I am checking is misleading.	.794
23. While I am checking, I feel as though my senses might be missing something.	.754
19. While I am checking, I don't feel I can completely trust what I am seeing.	.753
15. While I am checking, I wonder if I am having trouble seeing and hearing.	.695
7. While I am checking, I don't feel I can completely trust what I am feeling with my hands.	.590
26. I have difficulty keeping my attention focused on what I am checking.	.585
16. I can be easily distracted while I am checking.	.388
20. While I am checking, I sometimes do it automatically and forget to pay attention to the details.	.356
<u>Excluded Items</u>	
17. While I am checking, I am able to pay attention to the most important details. (R)	
22. While I am checking, I am able to shift my attention to the most important details. (R)	
25. If I make mistakes while checking, I am confident I will notice them. (R)	

Table 3

Means and standard deviations for all study variables

Variable	Mean (SD)	Maximum
Confidence in Memory		
MACCS general memory (n=164)	38.7 (11.5)	64
Obsessive-Compulsive Symptoms		
VOCI (n=164)	49.8 (11.5)	182
VOCI checking (n= 158)	5.45 (5.44)	20
OBQ-44 Responsibility/Threat (n=163)	56.9 (14.8)	99
OBQ-44 Perfectionism/Certainty (n=163)	62.0 (16.0)	107
OBQ-44 Importance/Control of Thoughts (n=161)	35.7 (12.2)	65
Mood		
BDI (n=154)	12.9 (10.3)	42
BAI (n=162)	13.7 (10.5)	42
IPIP-NEO Neuroticism (n=163)	71.5 (13.1)	100

Table 4

Means and standard deviations for distrust in attention and perception

Variable	Mean (SD)	Maximum
Distrust in attention and perception (α=.86)		
7. While I am checking, I don't feel I can completely trust what I am feeling with my hands.	1.20 (1.26)	4
15. While I am checking, I wonder if I am having trouble seeing and hearing.	.830 (1.18)	4
19. While I am checking, I don't feel I can completely trust what I am seeing.	1.12 (1.22)	4
21. While I am checking, I don't feel I can completely trust what I am hearing.	.810 (1.04)	4
23. While I am checking, I feel as though my senses might be missing something.	1.23 (1.25)	4
28. What I am seeing and hearing while I am checking is misleading.	.790 (.981)	4
26. I have difficulty keeping my attention focused on what I am checking.	1.14 (1.06)	4
20. While I am checking, I sometimes do it automatically and forget to pay attention to the details.	1.99 (1.10)	4
16. I can be easily distracted while I am checking.	1.40 (1.22)	4
Total Score	10.5 (1.06)	29

Table 5
Zero-order correlations between all measures used in the present study

	1	2	3	4	5	6	7	8	9	10	11	12
1. MCIQ	**.855**											
2. VOCI	.507**	**.975**										
3. VOCI: Check	.448**	.839**	**.916**									
4. OBQ: RT	.402**	.618**	.524**	**.888**								
5. OBQ: PC	.191*	.498**	.390**	.716**	**.890**							
6. OBQ: ICT	.369**	.476**	.380**	.645**	.432**	**.908**						
7. MAASLO	.391**	.339**	.266**	.385**	.284**	.000	**.892**					
8. MACCS: GM	.355**	.300**	.287**	.417**	.119	.392**	.341**	**.944**				
9. ICQ	.390**	.474**	.427**	.576**	.322**	.457**	.383**	.460**	**.917**			
10. BAI	.367**	.553**	.400**	.421**	.337**	.359**	.447**	.265*	.443**	**.924**		
11. BDI-II	.362**	.557**	.394**	.378**	.361**	.424**	.500**	.381**	.343**	.609**	**.933**	
12. IPIP: Neur	.303**	.428**	.318**	.471**	.376**	.425**	.403**	.491**	.446**	.466**	.555**	**.865**

** Correlation significant at 0.01 level (2-tailed)
* Correlation significant at 0.05 level (2-tailed)
MCIQ= distrust in attention and perception; VOCI= Vancouver Obsessional Compulsive Inventory total score; VOCI: Check= Vancouver Obsessional Compulsive Inventory: Checking subscale score; OBQ:RT= Obsessive Beliefs Questionnaire: Responsibility and threat estimation; OBQ:PC= Obsessive Beliefs Questionnaire: Perfectionism and intolerance for uncertainty; OBQ:ICT= Obsessive Beliefs Questionnaire: Importance and control of thoughts; MAASLO= Mindful Attention Awareness Scale- Lapses Only; MACCS:GM= Memory and Cognitive Confidence Scale: General Memory; ICQ= Inferential Confusion Questionnaire; BAI= Beck Anxiety Inventory; BDI-II: Beck Depression Inventory; IPIP: Neur= IPIP NEO Neuroticism subscale
Notes: Analyses above conducted on N ranging from 149 to 159 due to incomplete data. Cronbach's α reliability estimates presented on diagonal in bold type.

Table 6
Partial correlations between all measures used in the present study controlling for anxiety, depression, neuroticism

	1	2	3	4	5	6	7	8
1. MCIQ								
2. VOCI	.319**							
3. VOCI: Check	.330**	.804**						
4. OBQ R/T	.264**	.485**	.390**					
5. OBQ P/C	.038	.353**	.246**	.633**				
6. OBQ ICT	.181*	.303**	.244**	.546**	.257**			
7. MAASLO	.217**	.011	.054	.191*	.101	.070		
8. MACCS: GM	.270**	.066	.122	.238**	-.111	.195*	.134	
9. ICQ	.195*	.278	.288**	.438**	.138	.229	.157	.305**

** Correlation significant at 0.01 level (2-tailed)
* Correlation significant at 0.05 level (2-tailed)
MCIQ= distrust in attention and perception; VOCI= Vancouver Obsessional Compulsive Inventory total score; VOCI: Check= Vancouver Obsessional Compulsive Inventory: Checking subscale score; OBQ:RT= Obsessive Beliefs Questionnaire: Responsibility and threat estimation; OBQ:PC= Obsessive Beliefs Questionnaire: Perfectionism and intolerance for uncertainty; OBQ:ICT= Obsessive Beliefs Questionnaire: Importance and control of thoughts; MAASLO= Mindful Attention Awareness Scale- Lapses Only; MACCS:GM= Memory and Cognitive Confidence Scale: General Memory; ICQ= Inferential Confusion Questionnaire; BAI= Beck Anxiety Inventory; BDI-II: Beck Depression Inventory; IPIP: Neur= IPIP NEO Neuroticism subscale
Note: N=139 due to incomplete data

Table 7

Hierarchical regression analysis predicting memory distrust from distrust of attention and perception

Step	Predictors	R^2	R^2_{change}	F_{change}
Dependent Variable: MACCS General Memory				
1	BDI-II, BAI, IPIP-NEO: Neuroticism	.26	.26	16.90**
2	MCIQ attention and perception	.32	.05	10.96**

Predictor Variables	β	t
Coefficients after step 2		
BDI-II	-.09	-0.93
BAI	.12	1.20
IPIP-NEO: Neuroticism	.40	4.68**
MCIQ attention and perception	.26	3.31**

** Result significant at 0.01 level (2-tailed)
* Result significant at 0.05 level (2-tailed)
MACCS: GM= Memory and Cognitive Confidence Scale: General Memory; BDI-II: Beck Depression Inventory; BAI= Beck Anxiety Inventory; IPIP: Neuroticism= IPIP NEO Neuroticism subscale; MCIQ= distrust in attention and perception.

Table 8

Hierarchical regression analysis predicting checking symptoms from distrust of attention and perception while controlling for distrust in memory

Step	Predictors	R^2	R^2_{change}	F_{change}
Dependent Variable: VOCI checking				
1	BDI-II, BAI, IPIP-NEO: Neuroticism, MACCS: General Memory, study location	.24	.24	8.84**
2	MCIQ attention and perception	.33	.08	15.68**
Predictor Variables		β	t	
Coefficients after step 2				
BDI-II		.10	.983	
BAI		.21	2.28*	
IPIP-NEO: Neuroticism		.05	.516	
MACCS: General Memory		.03	.390	
study location		.16	2.25**	
MCIQ attention and perception		.32	3.96**	

** Result significant at 0.01 level (2-tailed)
* Result significant at 0.05 level (2-tailed)
VOCI: Checking= Vancouver Obsessional Compulsive Inventory: Checking subscale score; BDI-II: Beck Depression Inventory; BAI= Beck Anxiety Inventory; IPIP: Neuroticism= IPIP NEO Neuroticism subscale; MACCS:GM= Memory and Cognitive Confidence Scale: General Memory; MCIQ= distrust in attention and perception

Table 9

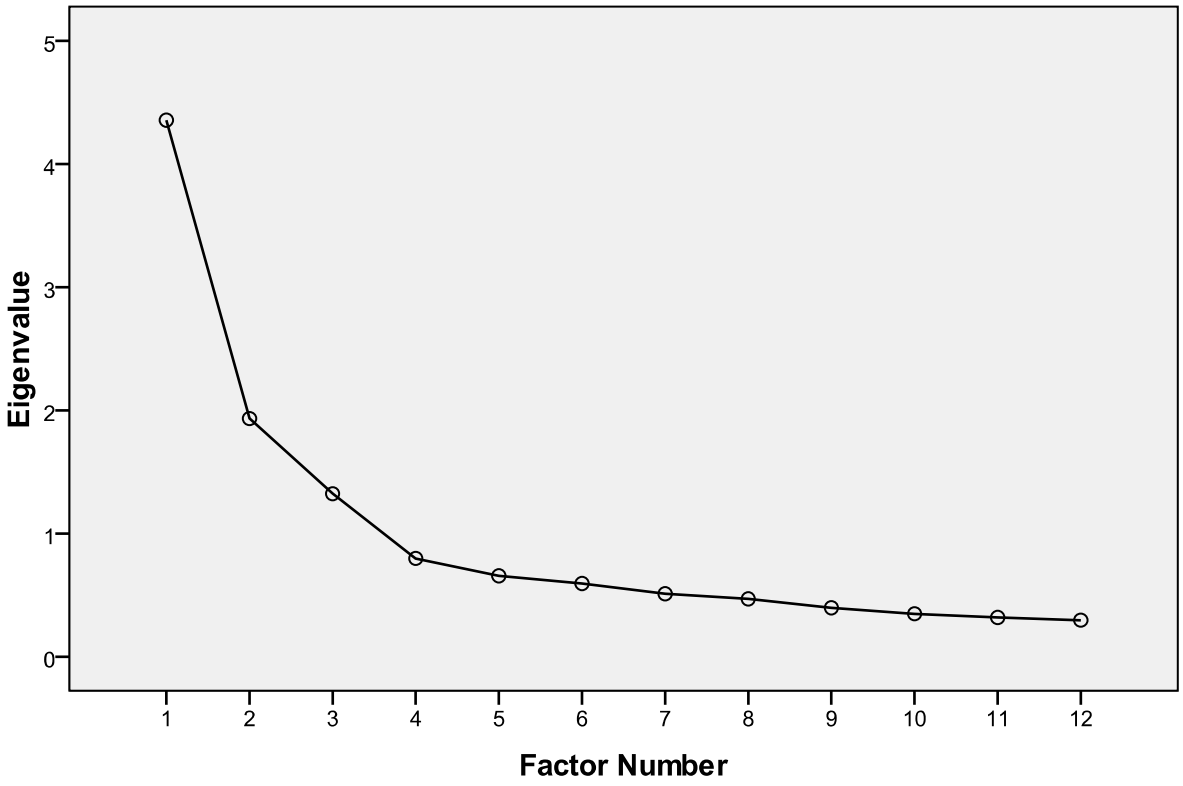
Hierarchical regression analysis predicting checking symptoms from distrust of attention and perception while controlling for OCD beliefs

Step	Predictors	R^2	R^2_{change}	F_{change}
Dependent Variable: VOCI checking				
1	OBQ P/C; OBQ ICT; OBQ R/T	.28	.28	19.37**
2	MCIQ attention and perception	.34	.06	13.63**
Predictor Variables		β	t	
Coefficients after step 2				
OBQ P/C		.08	.818	
OBQ ICT		.03	.333	
OBQ R/T		.34	2.82**	
MCIQ attention and perception		.28	3.69**	

** Result significant at 0.01 level (2-tailed)
* Result significant at 0.05 level (2-tailed)
VOCI: Checking= Vancouver Obsessional Compulsive Inventory: Checking subscale score; OBQ:PC= Obsessive Beliefs Questionnaire: Perfectionism and intolerance for uncertainty; OBQ:ICT= Obsessive Beliefs Questionnaire: Importance and control of thoughts; OBQ:RT= Obsessive Beliefs Questionnaire: Responsibility and threat estimation; MCIQ= distrust in attention and perception

Figure 1.

Exploratory factor analysis: Scree plot of eigenvalues



Appendices

Appendix A: Memory and Checking Influences Questionnaire (MCIQ)

Instructions: Most individuals report that they engage in some type of checking behaviour. Common examples include:

- Checking whether or not an object or situation is safe. For example, checking that the stove is off, that the doors are locked, that hair straighteners and other appliances are not on, that harmful substances are out of reach, etc.
- Checking whether or not a task has been completed without errors.
- Checking to ensure that you haven't caused harm to anyone. For example, checking that you haven't hit anyone with your car, checking to make sure that no one has fallen ill from food you served them, checking that tins have no dents, checking the newspaper and radio to see if there has been an accident or illness breakout.
- Checking for contaminants. For example, checking the environment for the presence of contaminants (e.g., used band aids, needles, bodily fluids), checking yourself for cuts, checking to see if others have symptoms of illness, etc.
- Mentally checking--checking in your head without any observable behaviour. For example, examining your memories to establish whether or not you possess specific personality characteristics, checking your body to see if you have responded to something a certain way, getting a memory for an action you just completed and checking that memory for evidence you completed it properly.

Please take a moment to think to think of something that you frequently check. If you have more than one item or situation in mind, please choose the one you check *most frequently.*

Write a brief description of that item or situation here. Please describe the item or situation you check, how you check it, and how often you check it.

What I check:_____
_____
_____

How I check:_____
_____
_____

How often I check:
Number of times per day:_____
Number of days per week: _____

How do you decide that you can stop checking this item or situation? What are the thoughts, emotions or events that let you know that it's safe to move on?

_____
_____
_____

Please rate each statement below based on this item or situation. Put a circle around the number that best describes how much you agree with the statement.

[0= never; 1= sometimes; 2=average; 3= often; 4=always]

1. While I check, I am usually satisfied that I have enough information to tell me whether or not the situation is safe.	0	1	2	3	4
2. As I recall the check, I try to remember one or two key details about when I checked.	0	1	2	3	4
3. As I recall the check, I can usually remember most details about when I checked.	0	1	2	3	4
4. While I check, I use my feelings to tell me whether or not things are okay.	0	1	2	3	4
5. While I check, I am usually satisfied that I have the right type of information to tell me whether or not things are okay.	0	1	2	3	4
6. As I recall the check, I try to remember everything I saw while I was checking.	0	1	2	3	4
7. While I am checking, I don't feel I can completely trust what I am feeling with my hands.	0	1	2	3	4
8. As I recall the check, I try to remember my feelings while I was checking.	0	1	2	3	4
9. During my check, there is usually one specific piece of information I look for to tell me that things are okay.	0	1	2	3	4
10. As I recall the check, I try to remember everything I heard while I was checking.	0	1	2	3	4
11. As I recall the check, there is usually at least one important detail I cannot remember.	0	1	2	3	4
12. As I recall the check, I try to remember my thoughts while I was checking.	0	1	2	3	4
13. As I recall the check, I try to remember as many details as I can about when I checked.	0	1	2	3	4
14. While I check, I use information from the situation around me to tell me whether or not things are okay.	0	1	2	3	4

15. While I am checking, I wonder if I am having trouble seeing and hearing.	0	1	2	3	4
16. I can be easily distracted while I am checking.	0	1	2	3	4
17. While I am checking, I am able to pay attention to the most important details. (R)	0	1	2	3	4
18. As I recall the check, I try to remember everything I touched while I was checking.	0	1	2	3	4
19. While I am checking, I don't feel I can completely trust what I am seeing.	0	1	2	3	4
20. While I am checking, I sometimes do it automatically, and forget to pay attention to the details.	0	1	2	3	4
21. While I am checking, I don't feel I can completely trust what I am hearing.	0	1	2	3	4
22. While I am checking, I am able to shift my attention to the most important details. (R)	0	1	2	3	4
23. While I am checking, I feel as though my senses might be missing something.	0	1	2	3	4
24. While I check, I use my thoughts to tell me whether or not things are okay.	0	1	2	3	4
25. If I make mistakes while checking, I am confident I will notice them. (R)	0	1	2	3	4
26. I have difficulty keeping my attention focused on what I am checking.	0	1	2	3	4
27. While I check, I look for as many pieces of information as I can to tell me that things are okay.	0	1	2	3	4
28. What I am seeing and hearing while I am checking is misleading.	0	1	2	3	4